Listing of Claims

1. (Previously Presented) A method for manufacturing cemented tungsten carbide components, comprising:

forming a composite material out of tungsten carbide powder and binder powder;

pressing the composite material into a plurality of components;

heating the plurality of components under pressure to liquefy the binder;

cooling the plurality of components until the binder solidifies;

cascading the plurality of components in a cascading machine in a low-energy processing media including an abrasive under low-energy conditions; and

cascading the plurality of components in the cascading machine in a high-energy processing media different from the low-energy media which does not include an abrasive under high-energy conditions.

2. (Previously Presented) The method of Claim 1, wherein the cascading machine is operated at a spindle speed of approximately 100 to 300 RPM during the high-energy conditions.

3. (Original) The method of Claim 2, wherein the spindle speed is selected based upon an average mass of the plurality of components.

4. (Previously Presented) The method of Claim 1, wherein the plurality of components is cascaded for approximately 20 minutes in the low-energy processing media and approximately 10 to 90 minutes in the high energy processing media.

5. (Original) The method of Claim 1, wherein the cascading machine comprises a plurality of barrels radially disposed around a spindle, each of the plurality of barrels being configured to contain at least a fraction of the plurality of components.

6. (Original) The method of Claim 5, wherein each of the plurality of barrels is axially, irrotationally coupled about an axis of the barrel parallel to a central axis of the spindle.

7. (Original) The method of Claim 5, wherein the plurality of barrels comprise hexagonal barrels.

8. (Original) The method of Claim 5, further comprising selecting a volume of each of the plurality of barrels to control the amount of energy imparted to the plurality of components within the plurality of barrels.

9. (Previously Presented) The method of Claim 5, wherein cascading the plurality of components under high-energy conditions comprises placing the plurality of components in the plurality of barrels, the plurality of barrels being filled with liquid and detergent, and cascading the plurality of barrels at high speeds.

10. (Original) The method of Claim 1, further comprising grinding each of the plurality of components to a desired size.

11. (Previously Presented) The method of Claim 1, wherein the low-energy processing media used for cascading the plurality of components in the cascading machine under low-energy conditions consists essentially of the abrasive and water, and wherein the high-energy processing media used for cascading the plurality of components in the cascading machine under high-energy conditions consists essentially of water and detergent.

12. (Original) The method of Claim 1, further comprising selecting a time and a spindle speed for the cascading machine based upon the material grade, size, and geometry of the plurality of components

13. (Original) The method of Claim 1, wherein the binder is cobalt.

14. (Previously Presented) The method of Claim 1, wherein the plurality of components are cascaded at high-energy conditions resulting in hardness of the plurality of components increasing by 0.4 to 1.6 HRa and toughness of the plurality of components increasing by 2 to 2.5 times a pre-cascading value.

15. (Original) The method of Claim 1, wherein heating the plurality of components to liquefy the binder includes heating the plurality of components under pressure to liquefy the binder.

16. (Previously Presented) A method of increasing the surface hardness of cemented tungsten carbide components, comprising:

cascading the plurality of components in a cascading machine in a low-energy processing media including an abrasive under low energy conditions; and

cascading a plurality of tungsten carbide components in the cascading machine in a high-energy processing media different from the low-energy media which does not include an abrasive under high-energy conditions.

17. (Previously Presented) The method of Claim 16, wherein the cascading machine is operated at a spindle speed of approximately 100 to 300 RPM during the high-energy conditions.

18. (Original) The method of Claim 17, wherein the spindle speed is selected based upon an average mass of the plurality of components.

19. (Original) The method of Claim 16, further comprising selecting a spindle speed of the cascading machine based upon the material grade, size, and geometry of the plurality of components.

20. (Previously Presented) The method of Claim 16, wherein the plurality of components is cascaded for approximately 20 minutes in the low-energy processing media and approximately 10 to 90 minutes in the high-energy processing media.

21. (Original) The method of Claim 16, wherein the cascading machine comprises a plurality of barrels radially disposed around a spindle, each of the plurality of barrels being configured to contain at least a fraction of the plurality of components.

22. (Original) The method of Claim 21, further comprising selecting a volume of each of the plurality barrels to control the amount of energy imparted to the plurality of components within the plurality of barrels.

23. (Original) The method of Claim 21, wherein each of the plurality of barrels is axially, irrotationally coupled about an axis of the barrel parallel to a central axis of the spindle.

24. (Original) The method of Claim 21, wherein the plurality of barrels comprise hexagonal barrels.

25. (Previously Presented) The method of Claim 21, wherein cascading the plurality of components under high-energy conditions comprises placing the plurality of components in

the plurality of barrels, the plurality of barrels being filled with liquid and detergent, and cascading the plurality of barrels at high speeds.

26. (Previously Presented) The method of Claim 16, wherein the low-energy processing media used for cascading the plurality of components in the cascading machine under low-energy conditions consists essentially of an abrasive and water, and wherein the high-energy processing media used for cascading the plurality of components in the cascading machine under high-energy conditions consists essentially of water and detergent.

27. (Previously Presented) The method of Claim 16, wherein the plurality of components are cascaded at high-energy conditions resulting in hardness of the plurality of components increasing by 0.4 to 1.6 HRa and toughness of the plurality of components increasing by 2 to 2.5 times a pre-cascading value.

28. (Previously Presented) A method, comprising:

cascading a plurality of tungsten carbide components in a cascading machine in a low-energy processing media consisting essentially of a cutting abrasive and water under low-energy conditions; and

cascading the plurality of tungsten carbide components in the cascading machine in a high-energy processing media different from the low-energy media and consisting essentially of a detergent and water under high-energy conditions.

29. (Previously Presented) The method of Claim 28, wherein the cascading machine is operated at a spindle speed of approximately 100 to 300 RPM during the high-energy conditions.

30. (Original) The method of Claim 29, wherein the spindle speed is selected based upon an average mass of the plurality of components.

31. (Original) The method of Claim 28, further comprising selecting a spindle speed of the cascading machine based upon the material grade, size, and geometry of the plurality of components.

32. (Previously Presented) The method of Claim 28, wherein the plurality of components is cascaded for approximately 20 minutes in the low-energy processing media and approximately 10 to 90 minutes in the high-energy processing media.

33. (Original) The method of Claim 28, wherein the cascading machine comprises a plurality of barrels radially disposed around a spindle, each of the plurality of barrels being configured to contain at least a fraction of the plurality of components.

34. (Original) The method of Claim 33, further comprising selecting a volume of each of the plurality barrels to control the amount of energy imparted to the plurality of components within the plurality of barrels.

35. (Original) The method of Claim 33, wherein each of the plurality of barrels is axially, irrotationally coupled about an axis of the barrel parallel to a central axis of the spindle.

36. (Original) The method of Claim 33, wherein the plurality of barrels comprise hexagonal barrels.

37. (Previously Presented) The method of Claim 33, wherein cascading the plurality of components under high-energy conditions comprises placing the plurality of components in the plurality of barrels, the plurality of barrels being filled with the high-energy processing media, and cascading the plurality of barrels at high speeds.

38. (Canceled).

39. (Previously Presented) The method of Claim 28, wherein the plurality of components are cascaded at high-energy conditions resulting in hardness of the plurality of components increasing by 0.4 to 1.6 HRa and toughness of the plurality of components increasing by 2 to 2.5 times a pre-cascading value.

40. (Canceled).

41. (Previously Presented) The method of Claim 28, wherein the plurality of cemented abrasive components includes tungsten carbide components.

42. (Previously Presented) The method of Claim 28, wherein the plurality of cemented abrasive components includes polycrystalline diamond (PCD) components.